

Submission to Victorian Government Timber Industry Strategy, 16 May 2008

School of Forest and Ecosystem Science

The University of Melbourne

Contact:

Professor Rod Keenan

Water St, Creswick, VIC 3363.

03 53214124, rkeenan@unimelb.edu.au

Key points

1. Victoria has Australia's largest forest industry sector in terms of plantation area, log volume production and timber value. This sector makes an important economic and social contribution to rural Victoria and provides essential resources for the regional manufacturing and construction industries.
2. The historical success of the forest industry in Victoria has been underpinned by investment in research and education.
3. In recent years, investment by the state government in research and education to support the future development of the timber industry has declined significantly. Unless new financial resources are forthcoming through this strategy there is likely to be a further drop in research funding, putting at risk past investment in research and the future development of the sector.
4. Investment in research can support key opportunities to increase resource use efficiency and add value in the plantation and native forest sectors and to expand the forest estate to meet regional economic development, climate change mitigation, improved water quality and biodiversity conservation objectives.
5. Research investment is required to enable the sector to effectively address challenges of climate change, fire, biosecurity and water resource management issues.
6. There is the potential for research to support new industries and markets in bioenergy and biomaterials.
7. Research should be closely linked to education to ensure that an effective innovation system is created within the sector.
8. Research funding should be undertaken through strategic investment platforms that link government, universities, industry, CRCs, CSIRO and R and D Corporations.
9. New approaches to investment in professional and technical education are required to ensure that there are sufficient high quality personnel for a vibrant, innovative and sustainable forest industry in Victoria.

Introduction

Victoria's forests are significant natural assets. Forests provide resources for industry, livelihoods for many rural and regional areas, environmental services, habitat for biodiversity conservation, and recreation and cultural and spiritual values. Managing, protecting, maintaining and enhancing this wide variety of goods, benefits and services requires a sound scientific understanding of forest ecosystems and their responses to different types of management and to natural disturbances and high quality, well-trained professional forest managers. Research and development has been fundamental to improved forest management and the development of a productive and profitable forest industry in Australia.

The School of Forest and Ecosystem Science, The University of Melbourne

The School of Forest and Ecosystem Science was created in July 2004 from the staff, assets and infrastructure of the University's School of Forestry and the Victorian Department of Sustainability and Environment (DSE). This new grouping now represents one of the largest centres of forest research in the Southern Hemisphere. The School has over 80 staff, including nearly 50 research and teaching staff and over 30 support staff with research and teaching strengths in forest ecosystem processes and climate change (tree physiology and gas exchange), forest tree molecular biology and biotechnology, forest fire management and ecology, forest products and processing, sustainable forest management and harvesting, forest plantation production, forest health and forested water catchment management. The School is a partner in three Cooperative Research Centres: Bushfire, Forestry and Wood Innovations.

Trends in forest management and forest industries

The forest sector is undergoing rapid change, around the world and across Australia. Major trends include an increasingly globalised timber market with China as the dominant buyer. There is a growing demand for wood products (particular in paper, paper board and biofuel) and increasing demands for forest ecosystem services (clean water, carbon storage and sequestration, biodiversity conservation and recreation for a growing middle class). There is a declining supply of timber from tropical countries, with some countries that were historically timber exporters becoming net importers. On the other hand there is an expansion of supply from more intensively managed natural forests and plantations in temperate and some boreal regions. Much of the production capacity for processed wood products is moving to developing countries and developed countries like Australia will need to put more emphasis on design and innovation if the timber industry is to prosper in future.

The development of global norms and standards through processes such as forest certification place greater expectations on forest managers. In many developing countries we are seeing a decline in management capacity, despite these higher international expectations and often complex and lofty written policies are adopted by governments. There is a trend to devolve management and decision making to local communities and facilitate capacity building and decision-making at that level. There is increasing private ownership of productive forest assets, particularly plantation resources. There is less focus on regulation and more on education and awareness raising and the provision of market-based financial incentives to achieve forest policy objectives. The implications of climate change are a major concern for forests and uncontrolled fire, insect pests and disease are becoming more significant global threats to forests.

Many of these global trends are mirrored in Victoria. Timber production from native forest has declined and the demand for certain traditional commodity products (eg. house framing, wood chips) will decline further as more consistent, higher quality product becomes available from plantations. Production of pulpwood from hardwood plantations will rapidly increase. Processing plants are reducing in number and increasing in size to remain competitive. Freight and labour costs are increasing, forest operations are becoming more mechanised and these changes are creating an industry preference for smaller, uniform-sized logs.

Trends in research funding

Forest research and development in Australia is conducted by federal and state government agencies, CSIRO, universities and private companies. Public research agencies and units are funded directly from government and through co-investment arrangements which may involve research and development corporations (e.g., Forest and Wood Products Australia, Rural Industries Research and Development Corporation and Land and Water Australia), Cooperative Research Centres (CRCs) and the Australian Research Council. Private companies in-source and out-source their research requirements and engage in direct and co-investment projects. These new pathways for research funding represent a significant shift in the source of resources for research and the way they are targeted. Broadly, we have seen a slight decline in overall research investment in the forest sector, with a shift in the proportion of contributions to the Federal Government and lower investment by state agencies.

Trends in Education

The education sector is also undergoing rapid change. Like other sectors, it too is becoming more globalised and competitive, with increasing pressure to consolidate and create efficiencies in program delivery while at the same time satisfying a more educated and urban-based potential student pool. Universities in Australia have become increasingly dependent on international

fee-paying students to remain financially viable and decline in Federal funding per student in real terms means that an increasing proportion of the cost of study is being met by students directly. Reduced funding means that the financial viability of high-cost programs with relatively low enrolments such as forest science are increasingly uncertain without other forms of support.

In Victoria there is a declining demographic trend in the school leaver population and with the current skill shortages across many industry sectors there are many different study and employment options for students and greater competition for students among university programs and for graduates in many specialised skill areas.

There is also a declining interest from the current generation of students in studying forestry. The forest sector is not generally perceived as an engine of innovation and creative development and even in countries where the industry has been a strong economic contributor (Canada, Finland, Sweden or the United States) the forest industry is often seen a sunset, smokestack sector, standing in contrast to the new 'knowledge society'. Erroneously, professional forestry is often perceived to be poorly paid, regionally-based and requiring skills with limited relevance to the wider society. Those seeking to enter university are choosing alternative disciplines that are perceived to have greater potential for professional development.

General points

We note that the goal of the strategy is to maximise the economic value to Victoria from production and processing of timber. This submission is focused on research and education (training and skills development) to meet these objectives.

There is a need for a strategic, long-term and coordinated approach to research investment to support the development of the timber industry in Victoria. This should be linked to research training and education, integrate the strengths of different organisations and engages all sectors of the industry and government agencies responsible for various aspects of resource management and protection. A particular gap is the capacity for sector-wide economic analysis. Investment is urgently required to rebuild research capability in this area.

Increasing investment in research activity and capacity in this sector, will benefit not only the Victorian community through improved productivity, added value and more sustainable management of forest resources but provide the basis for development of world class science with global benefits and impacts.

Research

Strategic investment in timber industry research needs to focus on the implications of climate change, plantation timber production, native forest

timber production, fire management, biosecurity, water management and emerging market opportunities.

IMPLICATIONS OF CLIMATE CHANGE

Climate change is a pervasive issue requiring inter-agency and inter-industry collaboration and co-ordination to identify and solve problems. The potential impacts of climate change and the adaptation mechanisms to address climate change are poorly understood and continued public and private sector support for scientific research is essential to improve this knowledge and increase the capacity for adaptive management in industries, ecosystems and communities. Forest management can play an important role in mitigating the impact of climate change by:

- sequestering carbon in new forests (plantations, agroforestry, reforestation)
- changing management practices in existing forests (avoided deforestation and land clearing, changing rotation lengths)
- storing carbon in wood products (increase carbon stocks)
- providing biomass for energy generation (reduced demand for fossil fuels, avoided emissions)

Forest research can improve industry capacity to adapt to climate change and increase the potential for forest management to mitigate greenhouse gas emissions and the potential impacts of climate change.

Research knowledge needs to be made available to policy makers, communities and industry in a usable form. Complex linkages between information, society, industry and public policy suggest the need for effective scientific engagement and communication with all sectors and stakeholder groups.

Outcomes

- Policy makers, communities and understand the effects of forest management on the carbon cycle and the potential role of forests in ameliorating the impacts of climate change
- The Victorian forest industry is adequately prepared for a carbon trading environment
- Forest and water resource managers can predict and manage the impact of climate change on water yields from forested catchments
- Fire management systems are adapted to changed climate conditions
- Forest landscapes are designed and managed for resilience under changing climate

Research strategies

- Investigate the potential vulnerability of forests and forest landscapes to climate change Identify species or ecological communities under risk from a shift in suitable climate niches.
- Invest in comprehensive monitoring and scientific infrastructure to support better understanding of responses to changing climate and other stresses.

- Develop improved carbon accounting systems to provide industry with the knowledge and tools suitable for use at scales appropriate for effective accounting of greenhouse gas emissions and to support mechanisms such as carbon trading.
- Socio-economic analysis of different policy instruments in mitigating the impacts of climate change.
- Develop and use process-based models to explore likely changes in water use by important forest types (including plantations) in key regions of Australia under different climate change scenarios
- Analyse alternative forest management options including the use of prescribed fire to minimise adverse impacts of climate change on water yield and quality
- Studies on fire risk and how they are projected to change under future climate scenarios and management options to reduce bushfire risks to forests, plantations and the community.
- Identify possible management options to minimise the adverse effects of climatic changes including “assisted migration” of native or plantation species to new habitats that are becoming suitable under changed climatic conditions or stand management options such as thinning and fertility management on stand survival

FOREST PLANTATION RESOURCES

The economic and environmental contribution of the plantation resources to the Victorian economy and environment can be significantly improved through research to support adding value to existing plantation resources and through expanding the plantation resource base, particularly into to lower rainfall regions that may become more marginal for agriculture. These strategies need to be effectively supported through research investment in biotechnology, biosecurity and management of water resources and social issues. Finally, the potential implications of and the development of strategies for adapting to climate change is a major area of research importance that is currently receiving relatively little investment.

Adding value to the existing plantation estate

The rapid expansion of eucalypt plantations and the decreasing size of regrowth eucalypt logs represents opportunities and challenges to growers and processors. Adding value to the increasing area of plantation hardwood represents a major economic opportunity. Some of this research is proceeding in partnership with other state agencies, CSIRO and industry through participation in the CRC for Forestry.

The University and its research partners in the CRC for Wood Innovations have also been instrumental in developing new technologies for wood drying, processing, treatment and application in furniture and design and there are opportunities to add value to existing lower quality softwood resources.

Outcome

- Increased value-adding to Victoria's hardwood and softwood resource.

Strategies

- Research to support development and adoption of new forest management techniques to produce higher value timber from plantation resources.
- Research to support new timber processing technologies that improve conversion efficiency and add value through design and innovation.

Expanding the plantation estate

Opportunities to expand the plantation estate are greatest in lower rainfall regions. These are often marginal for agricultural production, land is cheaper and plantations do not directly competing with higher value agriculture. Opportunities also lie in higher rainfall, 'lifestyle' farming zones where tree crops can be integrated with small-scale agriculture. Development of new woody crop options for the lower rainfall areas and increased integration of woody crops in agricultural production are being investigated in partnership with the CRC for Future Farm Industries.

Outcome

- Improved capacity to grow tree crops in low rainfall regions.

Proposed Strategies

- Build on current knowledge base through further species testing, genetic development, product and market development, and harvesting and processing technologies.
- Develop new wood crop production systems that can be more effectively integrated with existing agricultural enterprises.

NATIVE FOREST TIMBER HARVESTING

The native forest timber industry is significant to Victoria in both social and economic terms. It is estimated that processing of logs from native forests in eastern Victoria will generate a mill door value from initial processing of around \$500 million. This supports around 2,000 direct jobs and a similar level of indirect employment with most of the jobs being regionally based. In relation to the development of improved forest management and the development of a productive and profitable forest industry in Victoria, and Australia more generally, some comments are made under the following headings.

Adding value to native forest timber resources

The nature of the available resource from native forests is changing. Timber is mostly harvested from regrowth forests with smaller log sizes and different processing characteristics to those provided to sawmillers in the past. The demand for native timber residues as pulpwood for export woodchip is also

likely to decline as the supply of plantation-grown hardwood chip increases. There is increased pressure to utilise lesser-used, non-ash species due to the impacts of fire and other factors influencing forest resource planning. Research has been instrumental in supporting past structural adjustment to provide new processing techniques and processes for industry and new options for the use of different timber species. Much of this research can potentially be undertaken in partnership with those in the current CRC Wood Innovations (due to wind-up in June 2008), the CRC Forestry and with co-funding support from Forests and Wood Products Australia.

Outcome

- Greater industry capacity to utilise smaller logs and lesser utilised species.

Research strategies

- Systematic investigation of alternative processing options in partnership with industry.
- Research into alternative product options for lesser-used, non-ash species.

Managing impacts of timber harvesting

In Victoria, timber harvesting is highly regulated through a number of instruments including the Code of Practice for Timber Production and the Sustainable Forests (Timber) Act 2004. A critical element of the Act is the implementation of criteria and indicators for sustainable forest management (SFM) through an appropriate monitoring and reporting framework. While a number of indicators have a strong science base for measurement and reporting many do not and further research is required to provide this science base, particularly at the Forest Management Unit (FMU) level.

Implementation of a science-based framework for measurement and reporting of key indicators will provide the basis for determining if forest management practices are truly sustainable. The long-term nature of native forestry demands a long-term approach to research and monitoring.

Outcomes

- Improved capacity to monitor and report on key indicators of sustainable forest management.
- Greater public acceptance of forest harvesting operations as a result of improved information on the ecological impacts and mitigation strategies.

Research strategies

- Investment in development of long-term monitoring using cost-effective systems, based on remote sensing and ground-truthing
- Investment in properly-replicated long-term ecological research to study the effects of different forest management options (including timber harvesting and fire management options) on forest biodiversity and ecosystem functions such as water, carbon and nutrient cycling.

- Investment in social research to better understand public attitudes to timber harvesting and forest management and to provide for forest management systems that are more consistent with public expectations.

CROSS CUTTING ISSUES

Biosecurity

Protection of Victorian forests from pests and diseases is critical to the long-term sustainability of the forest industry. Climate change is likely to increase the likelihood and potential impact of future biosecurity threats. Pest or disease outbreaks can result in significant economic and environmental losses and cause serious hardship for industry and communities.

Biosecurity responses need appropriate institutional arrangements and mitigation and management mechanisms underpinned by reliable scientific knowledge and information is critical to effective implementation of prevention and response strategies. The 2007 National Industry Biosecurity Plan (IBP) for the plantation industry provides a framework for managing biosecurity issues. Research investment should aim to support the implementation and operation of this plan. Research should be coordinated nationally and there needs to be effective arrangements for integrating investments from different stakeholders.

Outcomes

- Victorian forests covered by national biosecurity plans jointly supported and implemented by governments and industry and supported by good science.
- Forest managers equipped with biologically, economically and environmentally effective tools for managing pest and disease threats.

Research strategies

- Improved methods for surveillance and early detection of exotic and established or indigenous forest pests and pathogens, including spatial analysis and environmental data to target resources, sentinel/hazard site surveillance and trapping technologies
- Continue development of remote sensing technology coupled with ground survey, to provide methods to support health surveillance programs across native forests and plantations

Fire management

Fire is a critical part of the Victorian forest landscape. Victorian forest ecosystems are well-adapted to fire. Many plants, animals and ecosystems are dependent in some way for fire their survival. Uncontrolled wildfires can also result in large impacts on ecosystem condition and productivity and destruction of rural property and resources and threats to human life and property. The recent major fire events in Victoria have demonstrated the potential implications of fire for the timber industry, including a potential

reduction in resource availability in the short to medium term, degradation of the forest resource, impacts on access roads and bridges and impacts on water quality and yields.

Outcomes

- Forest land managers better informed on the appropriate integration of burning regimes and timber production to provide for water, biodiversity conservation and carbon values from forests.
- Forest land managers with a better understanding of the risks of fire in different
- Burning regimes in native forest that meet multiple outcomes including protection of productive forest assets.
- A better understanding of the implications of fire regimes for timber supply and quality in Victorian native forests.
- Better management of plantation fires based on sound science.

Research strategies

- Research to support effective monitoring of forest conditions to support improved fire management responses.
- Research into fire behaviour in different types of landscapes and under different types of management and to provide for predictive assessment of the impacts of different fire management and suppression options.
- Research into the implications of different burning strategies on different guilds of fauna and flora in representative areas of Victoria.

Forests and water

Water security has been a major policy issue in Australia since European settlement. Continuing drought and uncertainty about future water availability under a changing climate is creating causing greater policy focus on this issue. Much of the high quality drinking water for Australian cities comes from forested catchments. Effective management of these catchments is a critical part of future water supply strategies. The potential impact of fire and its management in forested catchments on water quality and quantity is a significant concern. The potential impacts of plantation establishment on water interception and streamflow have also received considerable attention in the debate about allocation and pricing of Australia's water resources.

Research is required to support a holistic approach to analysis of land use and water allocation in which forest management is recognised in the context of the broader landscape and in which the benefits and disadvantages of different types of land uses are considered. Some of this research is proceeding through investment in the Forestry and e-Water CRC's and through investment by Melbourne Water, CMAs and other bodies.

Outcomes

- A balanced and equitable basis for allocating water that recognises the economic and environmental benefits of plantation and native forests

- A more integrated approach to water resource management based on sound understanding of the role of forests in the hydrological cycle.

Research strategies

- Investigation of water use of forest plantations and other forms of revegetation, including different species, in different environments and under different forms of management and incorporation of these results in catchment-scale models.
- Catchment-scale studies of the effects of the scale of plantations on water resource availability to other users
- Integrated analysis of the potential benefits and impacts of afforestation and plantation development on water quality and water yield.
- Studies on the potential impacts of climate change and reduced rainfall in catchments with different levels of forest cover.
- Studies on the implications of bushfire for water quality and yield in Victorian water catchments.
- Studies on the effects of thinning and other forest management options on native forest water catchments.

Biotechnology and genetic improvement

Biotechnology and tree genomics represents a significant opportunity to increase value adding through selection and breeding, improving plantation resistance to insects pests and diseases or other stresses such as drought and salinity and better understanding adaptation to climate change. Major international efforts in tree genomics research with direct relevance to Australia include the comparative conifer genomics programs at the US Department of Energy (US-DOE) and full-scale sequencing of the *Eucalyptus grandis* genome currently under way at the US-DOE JGI (expected completion by 2010, supported by the International Eucalyptus Genome Network, EUCAGEN). Australian governments have made relatively small contributions to these international efforts.

Recent research discoveries by scientists at the University of Melbourne and its partners have led to important developments in areas such as candidate gene association and induced somatic sector analysis that provide the basis for new approaches to genetic selection and tree improvement for high value timber characteristics, stress tolerance or other desirable tree and wood properties. A recent concept proposal by UM and CSIRO researchers (EPI-DOME, see attached) is aimed at providing the platform for extensive 'eco-sequencing' to complement research on full plant genome sequence.

Outcomes

- Identification of tree genes involved in determining biochemical and morphological wood and fibre characteristics for wood or bioenergy production
- Improved understanding of the impacts of ecological factors on tree genome evolution

- Better understanding of tree and forest adaptation to climate change
- Improved management for biodiversity conservation management through better understanding of tree and forest level adaptation to environmental variables.

Proposed strategies

- Research into candidate gene association and induced somatic sector analysis
- Support for Australian scientists participation in international sequencing studies.

Harvesting and transport research

Harvesting and transport is the most costly part of the forest production chain. It is also one of the major sources of greenhouse gas emissions for industry. Research to increase efficiency and reduce costs of harvesting can improve product value at the mill door and keep the forest industry competitive in a more globalised forest product market. Research capacity in this field has reduced across Australia and longer-term investment is required to rebuild capability. This is currently occurring through government, university and industry partnerships In the CRC for Forestry led by the University of Melbourne.

Outcomes

- Reduced operating costs for industry
- Reduced energy intensity and greenhouse emissions intensity of operations
- Increase value recovered from operations
- Improve the safety and wellbeing of workers involved in forest operations.

Research Strategies

- Implement and expand research on new and innovative knowledge, work methods, technology and tools with CRC Forestry Programme-3 industrial partners.

Emerging market opportunities

Biofuels, bioenergy and biomaterials

Wood has provided energy to people since the evolution of the human race. Wood is still the most widely used energy source on the planet. Forest industries have utilised wood in co-generation systems to provide energy for production systems and for kiln drying. More recently, technologies to improve the efficiency of energy recovery and the scale of energy supply from wood have become widespread in Europe and other parts of the world. Wood is also being increasingly considered as a potential supply of liquid fuels for transport.

Using a combination of biotechnology applications and new industrial processes, residues from traditional forest operations and new forest plantation resources can become the basis for new products such as bioplastics, natural chemicals, bioenergy and pharmaceuticals. This could include new biocomposite products, bioplastics and in thermoset resins that are renewably produced and more easily recycled and degraded at the end of the product life.

Outcome

- Biomass energy production systems that enhance energy security and reduce carbon emissions

Research strategies

- Research to support development and implementation of biomass energy technologies in line with introduction of carbon emission trading and other greenhouse mitigation objectives
- Research to support development of economically and socially feasible biomass energy production systems and integrated timber/biomass systems for different forest production conditions for a range of energy consumers
- Research to support the production of new generation biomaterials and biocomposite products from Victorian timber resources.

Education and training

Education is a critical component of sustainable forest management and a sustainable, innovative and forward looking timber industry. Given the challenges facing education institutions in maintaining viable educational programs in areas of relatively specialised expertise, new approaches are required to ensure that future generations of well-trained forest managers are available to the industry and the land management sector.

Outcome

- Viable and innovative programs for forest land and resource management and forest industry professional and technical training.

Education investment strategies

- Government support to professional education and training in the forest sector to meet their future requirements for skilled land and fire management professionals.
- Encouragement of industry support to key educational programs to meet their future needs.
- Investment to encourage collaboration across Victorian tertiary education institutions to ensure that the training needs of government and industry at technical and professional levels.